



## Limited available resources forces queuing



Resources available on demand, and optimized for specific compute task





## Is Cloud The Next Disruption in HPC?

Graham Russell Technical Director EMEA, Rescale  
December 2018



# High Performance Computing

Cray T3E MPP  
1995

Standard Processors  
2048 nodes  
1 TeraFlop

Equivalent to about 2  
Iphone 7s



# High Performance Computing

IBM Summit  
Oak Ridge NL  
2018

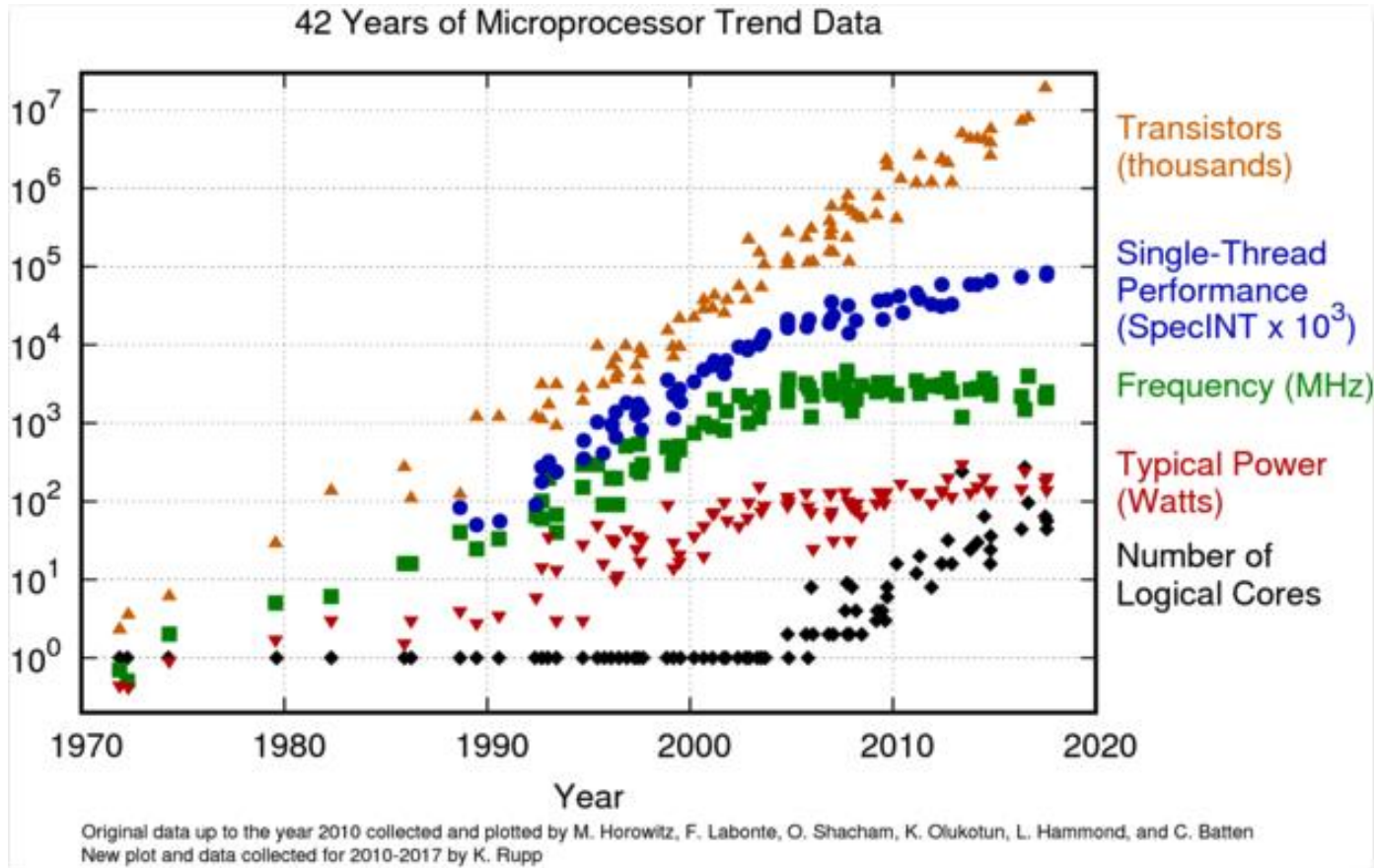
2.2M Power9 Cores  
2.1M GV100 Cores

122 Petaflops

122,000 x T3E

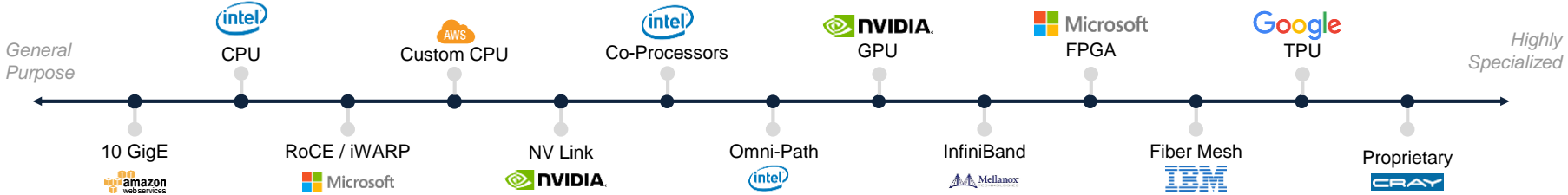


# Processor Performance is Reaching a Plateau



# The Move to Multiple Architectures

- Single thread plateauing
- Increasing server specialization
- Workload-centric stack important for optimal performance



# Challenge: Run on the best suited architecture

Abaqus/Standard

LS-DYNA

TensorFlow

On demand cluster provisioning



10 GigE Network

31GB SSD Storage

3.3 GB Memory

16 K80 GPU & 32 CPU

SERVER TUNING

Up to **5X speed up** over standard hardware



Infiniband Network

50 GB Storage

8 GB Memory

256 CPU

SERVER TUNING

Up to **2X speed up** over standard hardware



10 GigE Networking

Storage

Memory

TPU

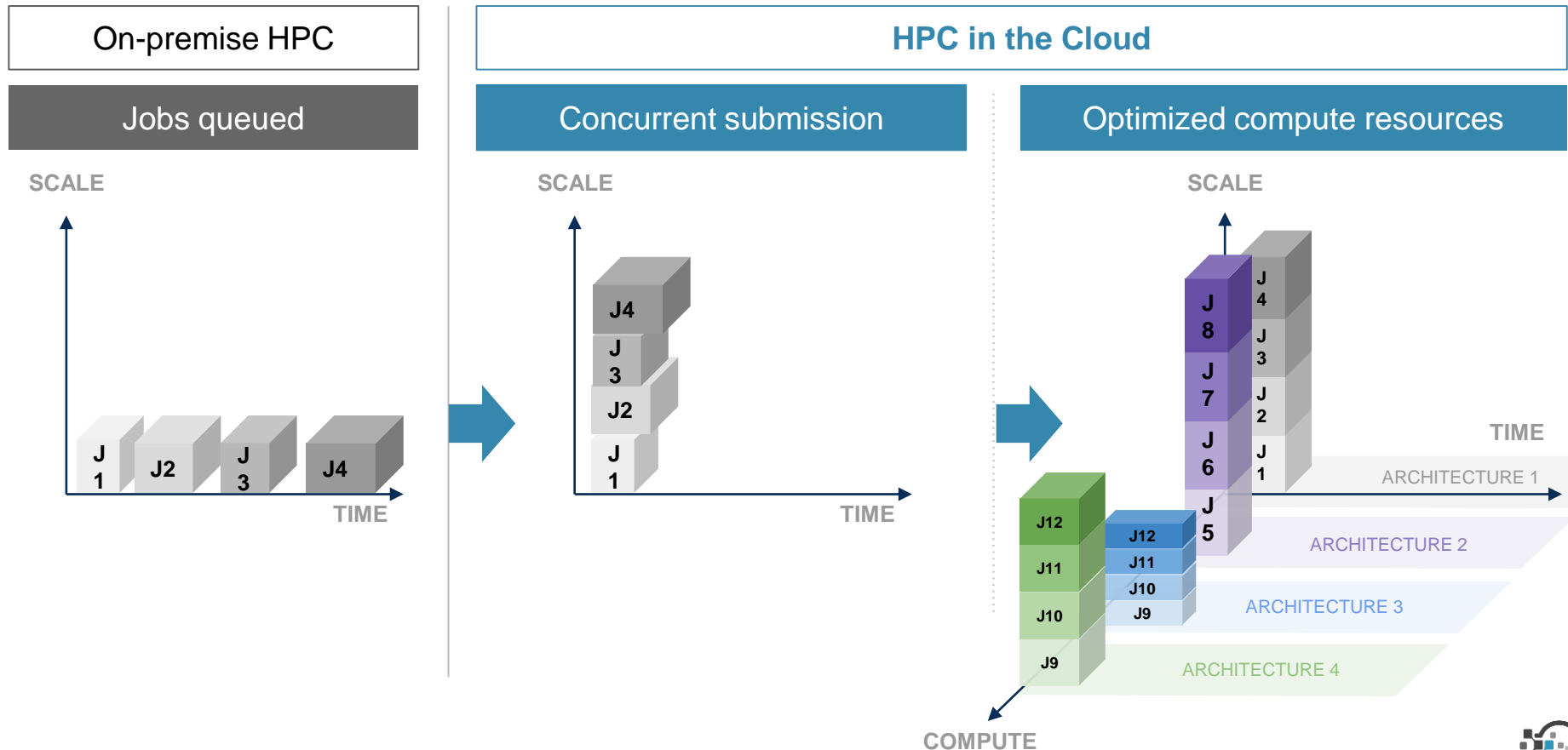
SERVER TUNING

Up to **30X speed up** over standard GPUs





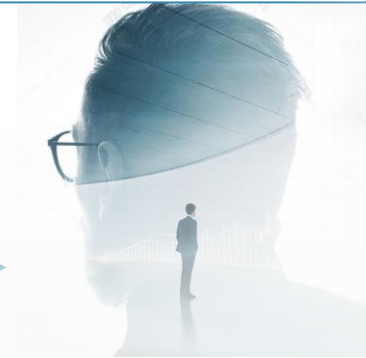
# Scalability: faster results, shorter turnaround time



# The Rescale Platform



FULLY INTEGRATED  
STACK OF  
ENTERPRISE  
DEPLOYMENT TOOLS



## Rescale ScaleX Platform

- Enterprise big compute
- Innovation acceleration
- User-first platform
- Security and admin controls



Graham Russell, Rescale - Is Cloud The Next Disruption in HPC?



# Rescale Platform implementation strategies

*Choose what is right for you, right now*



## Cloud Native

- Elastic scaling on demand
- Turnkey
- Zero IT footprint



## On-premise HPC

- Submit jobs on-premise
- Administration portal
- Analysis and reporting



## Hybrid: Cloud & On-premise

- Extend to cloud on demand
- Seamless transitioning between architectures
- Disaster recovery

*Advantages of both*

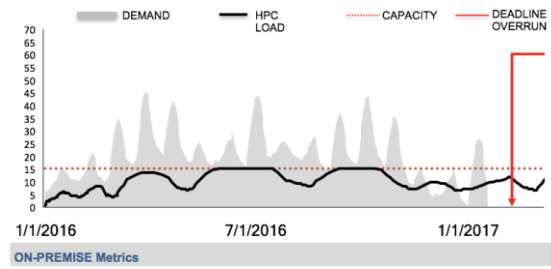
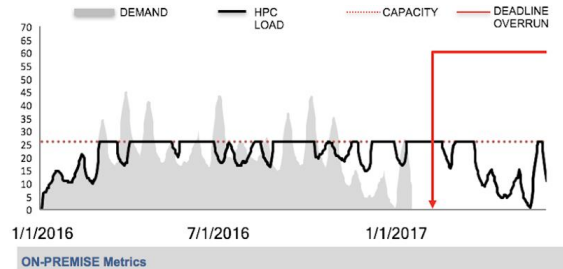


# Cloud-enabled Transformation

**Today - On-premise HPC**  
+ HIGH UTILIZATION   - SCHEDULE DELAYS

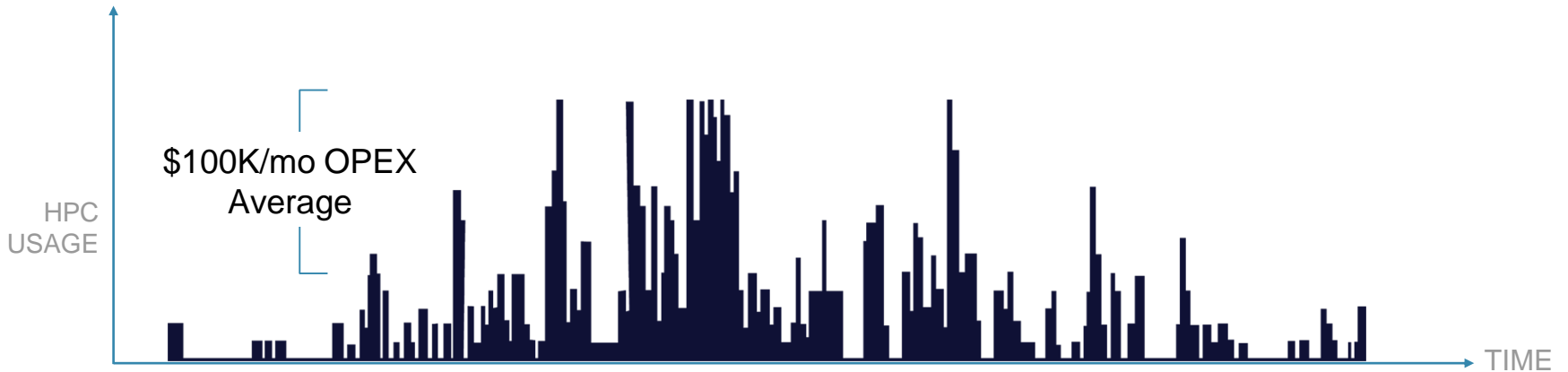
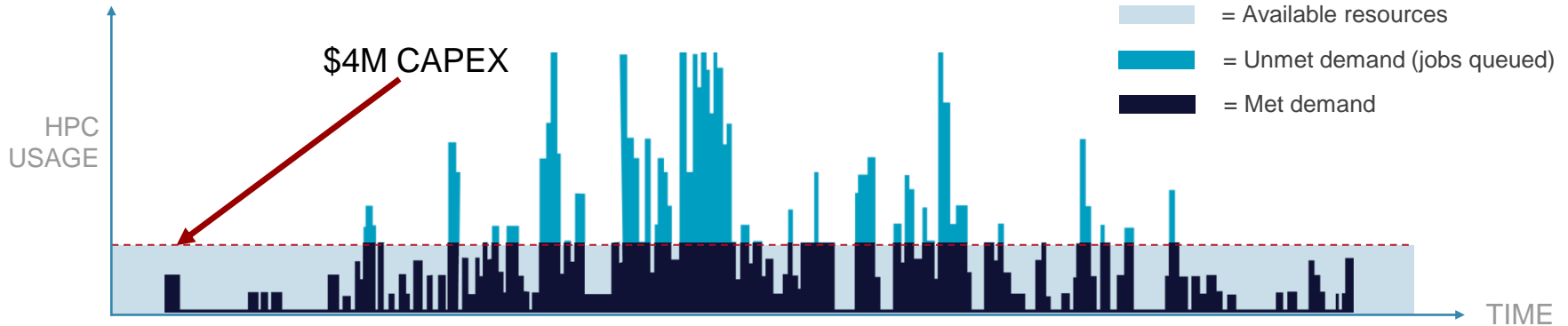


**Cloud-Enabled Transformation**  
+ LESS DELAY   + COST EFFICIENT   + SCALABLE



# Tier 1 automotive: HPC usage versus demand

*CAPEX replaced with lower monthly OPEX while increasing compute capacity and flexibility*



# User Job Submission

## Today

### PBS Script

```
#!/bin/bash
#PBS -N LS-DYNA job
#PBS -q onyx
#PBS -l nodes=1:ppn=8
#PBS -l walltime=1:00:00
ls-dyna -n -l -i
neon.refined.rev01.k -p single
```

On premise

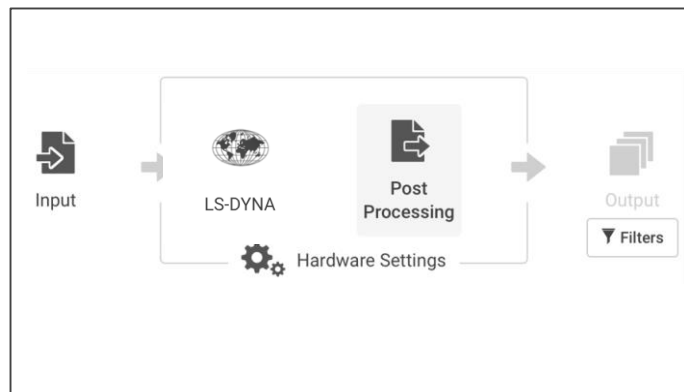
## With Rescale

### Rescale script

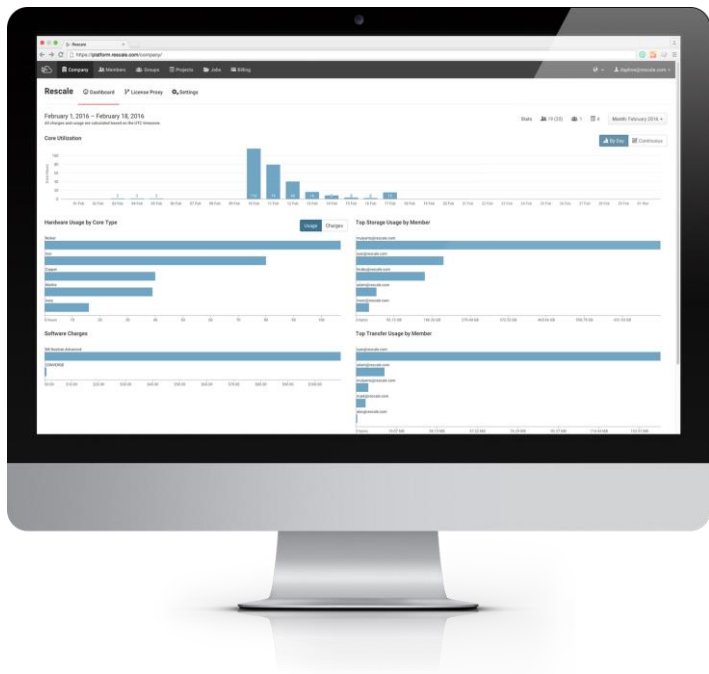
```
#!/bin/bash
#RESCALE_NAME="LS-DYNA job"
#RESCALE_ANALYSIS=ls_dyna
#RESCALE_CORE_TYPE=Onyx
#RESCALE_CORES=2
#RESCALE_WALLTIME=1
#USE_RESCALE_LICENSE
ls-dyna -n
$RESCALE_CORES_PER_SLOT -i
neon.refined.rev01.k -p
single
```

On premise and Multi-cloud

### GUI Workflow



# One platform to access and administer all systems



## Key Enterprise Features

### Role-based Access

- Manage users
- Manage roles
- Manage groups
- Manage projects

### Platform

- HW access, regions, and pricing
- SW access, licenses, and pricing
- Platform features access
- Data retention and sharing settings

### Security

- Restricted access by IP address range
- Password complexity rules
- Multi-factor authentication (MFA)
- User audit logs & notification rules

### Cost Management

- Budget by level
- Reports by application type
- Payment methods and history
- License usage optimizer

### Connect

- On-premise compute and storage
- PDM/SLM integration
- VPN
- Single sign-on (SSO)





rescale

## Customer Examples





# Wing Design

*With Cloud HPC*

- Instant access to a large system
- 3 month development in 24 hours
- 787 wing lighter by 150 pounds
- Cost savings of \$180M



# Rocket Design

*With Cloud HPC*

- Instant access to 1000 cpus
- Development speedup of 24x
- Tens of thousands of simulations validate design before launch



# Formula 1 Racing

*With Cloud HPC*

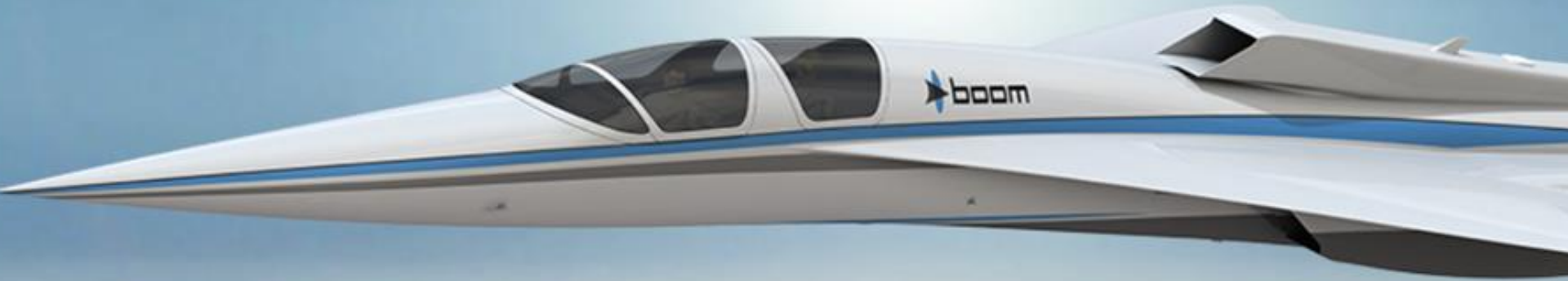
- Real world sensor data
- Trackside simulation
- 3000 simulations per lap
- F1 team adjusts race strategy



# Designing and Flying a Supersonic Virtual Plane

*With Cloud HPC*

- Pilots fly in the simulator the model of the plane being designed



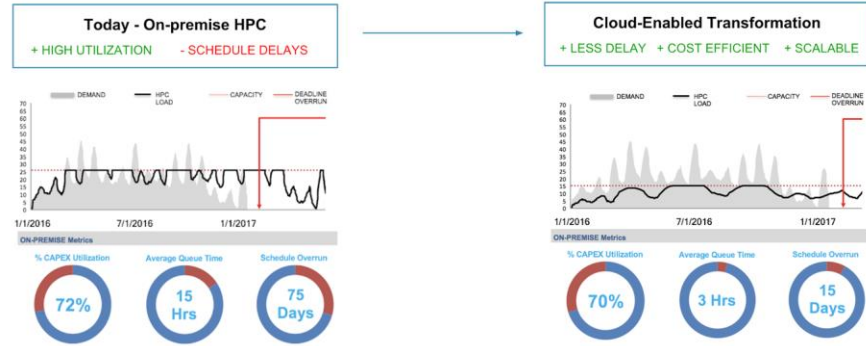
# Full deployment at Kyushu University

*University Selected Rescale for Next Generation Supercomputer*

- Rescale to access on premise and cloud
- Integrated Administration and Support
- Controls that eliminate budget overruns



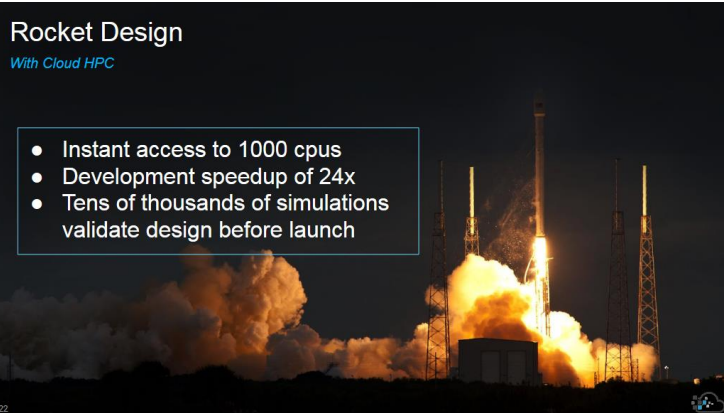
# In Summary



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*Extend HPC to the Cloud*

*Come and visit our booth*

